भारतीय मानक

Indian Standard

IS 4929 : 2023

डाइक्लोरवॉस, तकनीकी — विशिष्टि

(दूसरा पुनरीक्षण)

Dichlorvos, Technical — Specification

(Second Revision)

ICS 65.100.10

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
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February 2023 **Price Group 5**

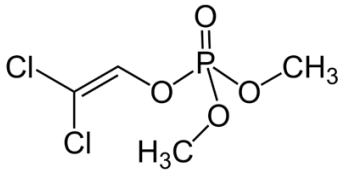
Pesticides Sectional Committee, FAD 01

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Pesticides Sectional Committee had been approved by the Food and Agriculture Divisional Council.

Dichlorvos, technical is used in the preparation of formulations for controlling pests of agricultural importance. This pesticide also finds use in public health and fumigating foodgrains.

Dichlorvos is the accepted common name by the International Organization for Standardization (ISO) for 2, 2-dichlorovinyl dimethyl phosphate. The empirical and structural formulae and the molecular mass are as given below:

Empirical Formula	*Structural Formula*	*Molecular Mass*
$C_4H_7O_4Cl_2P$		221.0

This standard was first published in 1968 and subsequently revised in 1978. In the first revision, the requirement pertaining to display of cautionary notice on package of the product were aligned with the *Insecticides Act*, 1968 and Rules framed thereunder as well as the packaging and marking requirements updated. Subsequently, in the year 2020 vide S.O. 1196 (E) dated 20 March 2020, dichlorvos was banned by Government of India for domestic use but continued to manufacture for export. In this revision, the standard has been brought out in the latest style and format of the Indian Standards, and references to Indian Standards wherever applicable have been updated. It also incorporates three amendments issued to this standard.

In the preparation of this standard due consideration has been given to the provisions of the *Insecticides Act*, 1968 and the Rules framed thereunder. However, this standard is subject to the restrictions imposed under these, wherever applicable.

The composition of the committee responsible for the formulation of this standard is listed in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

DICHLORVOS, TECHNICAL — SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for dichlorvos, technical.

2 REFERENCES

The standards, given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

IS No.	*Title*
IS 1070 : 1992	Reagent grade water — Specification (*third revision*)
IS 6940 : 1982	Methods of test for pesticides and their formulations (*first revision*)
IS 8190 (Part 2) : 1988	Requirements for packing of pesticides: Part 2 Liquid pesticides (*second revision*)
IS 10946 : 1996	Methods of sampling for technical grade pesticides

3 REQUIREMENTS

3.1 Description

The material shall be in the form of clear, mobile and amber coloured liquid free from extraneous impurities or added modifying agents.

3.2 The material shall also comply with the requirements specified in Table 1.

Table 1 Requirements for Dichlorvos, Technical
(*Clause* 3.2 *and* 7.1)

Sl No.	Characteristic	Requirement	Method of Test, Refer to
(1)	(2)	(3)	(4)
i)	Dichlorvos content, percent by mass, *Min*	92.0	Annex A
ii)	Moisture content, percent by mass, *Max*	0.02	IS 6940
iii)	Material insoluble in acetone, percent by mass, *Max*	0.5	IS 6940
iv)	Acidity (as H_2SO_4), percent by mass, *Max*	1.0	IS 6940

4 PACKING

4.1 The material shall be packed according to the requirements given in IS 8190 (Part 2).

5 MARKING

5.1 The containers shall be securely closed and shall be bear legibly and indelibly the following information:

a) Name of the material;
b) Name and address of the manufacturer;
c) Batch number;
d) Date of manufacture;
e) Date of expiry;
f) Net quantity;
g) Nominal dichlorvos content, percent (*m/m*);
h) Cautionary notice as worded in the *Insecticides Act*, 1968, and Rules framed thereunder; and
j) Any other information required under the Legal Metrology (Packaged Commodities) Rules, 2011.

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity

assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 SAMPLING

6.1 Representative sample of the material shall be drawn according to IS 10946.

7 TESTS

7.1 Tests shall be carried out as by the methods specified in co1 4 of Table 1.

7.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A
[*Table* 1, *Sl No.* i)]

DETERMINATION OF DICHLORVOS CONTENT

A-1 GENERAL

A-1.1 For determining the active ingredient in dichlorvos, technical, two methods namely, the iodometric method and infra-red spectrophotometric method have been prescribed. Either of these methods may be used for the determination of the active ingredient; however, in the event of dispute, the infra-red spectrophotometric method shall be used as the reference method.

A-2 IODOMETRIC METHOD

A-2.1 Principle

Dichlorvos reacts in alkaline solution with two equivalents of iodine and this reaction, as distinct from impurities, does not proceed with iodine in presence of sodium carbonate solution. Thereby it is possible to estimate it by this kind of differential method.

A-2.2 Reagents

A-2.2.1 *Iodine Solution* — 0.1 N.

A-2.2.2 *Sodium Hydroxide Solution* — 2 N.

A-2.2.3 *Hydrochloric Acid Solution* — 5 N.

A-2.2.4 *Sodium Thiosulphate Solution* — 0.1 N.

A-2.2.5 *Sodium Carbonate Solution* — 2 N.

A-2.2.6 *Starch Indicator Solution*

A-2.3 Procedure

Accurately weigh 1 g of the material and transfer into a 250 ml volumetric flask and add distilled water to 250 ml mark of the flask. Transfer 25 ml of this solution into an iodine flask and 20 ml of the standard iodine solution and then add 20 ml of the standard sodium hydroxide solution. Allow the solution to stand for 5 minutes at 20 °C to 30 °C and acidify with 20 ml of standard hydrochloric acid and titrate with the sodium thiosulphate using starch solution as the indicator. Note the titre (= A ml). Carry out a blank with the same quantities of the reagents. Note the titre (= V ml). For the second titration, pipette out 25 ml of the stock solution into another 250 ml iodine flask, add 5 ml of standard iodine solution and then add 10 ml sodium carbonate solution. Allow the solution to stand for 5 minutes at 20 °C to 30 °C, acidify with 20 ml hydrochloric acid and titrate with sodium thiosulphate solution using starch solution as indicator. Note the titre (= B ml). Carry out a blank with the same quantities of reagents. Note the titre (= U ml).

A-2.4 Calculation

A-2.4.1 Dichlorvos content, percent by mass = $\frac{[(V-A)-(U-B)] \times N \times 110.5}{M}$

where

N = normality of the standard sodium thiosulphate solution, and
m = mass, in g, of the sample taken for the test

A-3 INFRA-RED SPECTROPHOTOMETRIC METHOD

A-3.1 Method

The method consists in dissolving the material in chloroform, and measurement of the infrared absorbance at about 10.2 micron. This net absorbance is used to obtain the concentration of dichlorvos from previously prepared calibration curve relating to net absorbance to concentration of dichlorvos.

A-3.2 Apparatus

A-3.2.1 *Infra- Red Spectrophotometer*

Capable of recording in the region of 2 microns to 15 microns, with the slit width, gain and response time and scanning speed adjustable to produce a satisfactory signal-to-noise ratio and adequate resolution under the conditions of the test (in general, the minimum slit width giving a signal-to-noise ratio of about 100 to 1 is chosen).

A-3.2.2 *Absorption Cells*

Scaled absorption cells with sodium chloride or potassium bromide windows, having a path length of about 0.2 mm.

A-3.2.3 *Hypodermic Syringe* — of 1.0 ml capacity with an 18-gauge (stubbs) slip-on-type needle.

A-3.3 Reagents

A-3.3.1 *Standard Dichlorvos* — recrystallized, of known dichlorvos content.

A-3.3.2 *Chloroform* — analytical reagent grade.

A-3.4 Procedure

A-3.4.1 *Preparation Calibration Graph*

Prepare the calibration graph for samples in chloroform as given in **A-3.4.1.1** to **A-3.4.1.4**.

A-3.4.1.1 Weigh accurately into each of five 10-ml volumetric flasks 25 mg, 75 mg, 100 mg, 150 mg and 200 mg of the standard dichlorvos (*see* **A-3.3.1**); dissolve in chloroform and dilute to the mark (the concentrations of these solutions will be 2.5 g per litre, 7.5 g per litre, 10 g per litre, 15 g per litre and 20 g per litre).

A-3.4.1.2 Fill the absorption cell with chloroform by means of the hypodermic syringe. Adjust the spectrophotometer to the optimum instrument settings with respect to gain, slit width, response, chart speed and wave-length scanning speed. Make a scan with chloroform in the cell over the wave-length region of 9.9 microns to 10.6 microns.

A-3.4.1.3 Without changing the instrument settings, fill the cell, in turn, with each of the calibration solutions starting with the most dilute. Scan each of these solutions over the 9.9 microns to 10.6 microns.

A-3.4.1.4 For each of the scans obtained, draw perpendiculars to the zero radiation line through the absorption peak of the calibration solution at about 10.2 micron and the reference minima at about 10.0 micron and 10.4 micron. Measure the radiant power P_o and P as shown in Fig. 1. The distances may be measured in any convenient units, provided the same units are used throughout the determination. Calculate the absorbance as the logarithm of the ratio of the incident power (P_o) to the transmitted radiant power (P). Repeat the calculation of the absorbances of the calibration solution using the reference minimum at about 10.4 micron. Subtract the absorbance of the cell plus chloroform from the absorbances of the cell plus calibration solutions. Make a plot of the net absorbances as ordinate against the corresponding concentrations of dichlorvos in g/l as abscissa for each of the reference points used that is the absorption minima at about 10.0 micron and 10.4 micron respectively.

A-3.5 Estimation of Dichlorvos

Weigh accurately into a 50 ml volumetric flask an amount of sample sufficient to give a 1 percent (*m/v*) solution of dichlorvos and dilute to the mark with chloroform. Mix thoroughly and fill the calibrated liquid absorption cell with the sample solution. Using the same instrument settings that were used for the calibration, obtain a scan of the sample solution over the 9.9 micron to 10.6 micron region. Calculate the absorbances of the sample solution for the two reference minima as described in **A-3.4.1.1**.

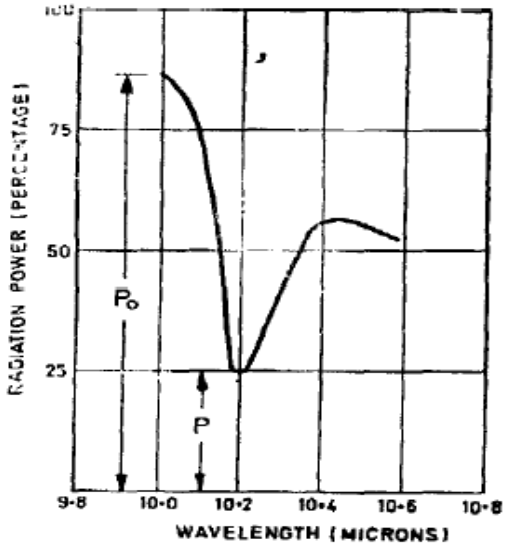


FIG. 1 DICHLORVOS INFRA-RED ABSORPTION SPECTRUM — REFERENCE-POINT TECHNIQUE

A-3.6 Calculation

From the computed absorbances (*see* **A-3.5**) read the concentrations of dichlorvos from the calibration graph (*see* **A-3.4.1.1**).

Dichlorvos content, percent by mass = $\frac{A \times V}{M \times 10}$

where

A = the mean value in, g/l, determined from the use of two reference minima;

V = volume, in ml, of the sample solution; and

M = mass, in g, of the sample.

ANNEX B
(*Foreword*)

COMMITTEE COMPOSITION
Pesticides Sectional Committee, FAD 01

Organization	*Representative(s)*
Directorate of Plant Protection Quarantine and Storage, Faridabad	DR RAVI PRAKASH **(*Chairperson*)**
All India Biotech Association, New Delhi	SHRI SAURABH SINGHAL SHRI SHAH JI DHAR (*Alternate*)
Central Insecticide Board and Registration Committee, Faridabad	SECRETARY DR VANDANA SETH (*Alternate*)
Central Insecticide Laboratory, Faridabad	DR ARCHANA SINHA SHRI SUBHASH CHAUDHARY (*Alternate*)
Consumer Guidance Society of India, Mumbai	SHRI SITARAM DIXIT DR M. S. KAMATH (*Alternate*)
Crop Care Federation of India, New Delhi	DR J. C. MAJUMDAR
Crop Life India, New Delhi	SHRI ASITAVA SEN MS NIRUPAMA SHARMA (*Alternate*)
CSIR -Indian Institute of Toxicology Research, Lucknow	DIRECTOR DR SHEELENDRA P. SINGH
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Food Safety and Standards Authority of India, New Delhi	ADVISOR (STANDARDS)
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Indian Agricultural Research Institute, New Delhi	DIRECTOR
Indian Institute of Packaging, Mumbai	DR TANWEER ALAM
Indian Pest Control Association, New Delhi	SHRI UDAYAN GHOSH
Institute of Pesticide Formulation Technology, Gurgaon	DR M. VAIRAMANI
Ministry of Agriculture, Department of Agriculture, Chennai	JOINT DIRECTOR OF AGRICULTURE (RES) DEPUTY DIRECTOR LAB (*Alternate*)
National Centre for Integrated Pest Management, New Delhi	DR SUMITRA ARORA
National Institute of Plant Health Management, Hyderabad	DR MAHESH SAINI MS T. SRIDEVI (*Alternate*)
Pesticide Manufactures and Formulators Association of India (PMFAI), Mumbai	DR ARCHANA SRIVASTAVA DR UDAY KUMAR (*Alternate*)

Organization	*Representative(s)*
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In Personal Capacity (*4-6-90/2/8/2, Sri Devi Nilayam Tejaswinagar Coloni, Attapur, Hyderabad – 500048*)	SHRI C. V. RAO
In Personal Capacity (*263, Sector 28, Faridabad – 121008, Haryana*)	SHRI VIPIN SAINI
BIS Directorate General	SHRIMATI SUNEETI TOTEJA, SCIENTIST 'E'/DIRECTOR AND HEAD (FOOD AND AGRICULTURE) [REPRESENTING DIRECTOR GENERAL (*Ex- officio*)]

Member Secretary

SHRI KULDEEP MITTAL
SCIENTIST 'B'/ASSISTANT DIRECTOR
(FOOD AND AGRICULTURE), BIS

Bureau of Indian Standards

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.

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Amend No.	Date of Issue	Text Affected

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